

JVC

SERVICE MANUAL

COLOUR TELEVISION

AV-28KH1BUF, AV-28KH1SUF

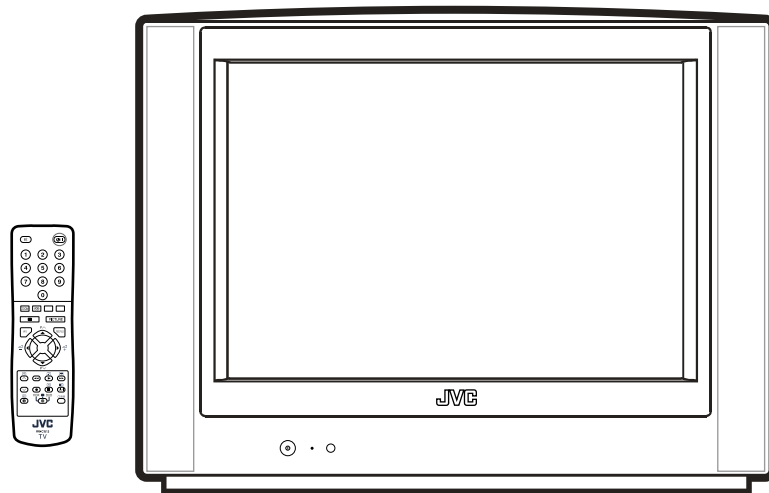


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SPECIFICATION

Items		Contents
Dimensions (W × H × D)		76cm × 57cm × 47.3cm
Mass		33kg
TV RF System		B/G, D/K, L/L'
Colour System	TV Mode	PAL / SECAM
	Video Mode	PAL / SECAM / NTSC 3.58 / NTSC 4.43
Sound System		NICAM / A2 (Germany system)
Teletext System		FLOF (Fastext) / TOP (German system)
Tuning System		Frequency synthesizer tuning system
Number of CH memory position		100 ch
Receiving Frequency	VHF Low	46.25MHz ~ 168.25MHz
	VHF High	175.25MHz ~ 463.25MHz
	UHF	471.25MHz ~ 863.25MHz
	CATV	S01-S04 & S75-S79
Intermediate Frequency	VIF	38.9MHz (B/G, D/K, L) / 33.9MHz (L')
	SIF	33.4MHz (5.5MHz:B/G) / 32.9MHz (6.0MHz:D/K) / 32.4MHz (6.5MHz:L) / 40.4MHz (6.5MHz:L')
Colour Sub Carrier Frequency		PAL (4.43MHz), SECAM (4.43MHz), NTSC (3.58MHz/4.43MHz)
Power Input		AC220V ~ AC240V, 50Hz
Power Consumption		151W(Max), 3W(Standby)
Aerial Input Terminal		75Ω unbalanced, coaxial
Picture Tube		Visible size : 66cm (Measured diagonally)
High Voltage		30kV
Speaker		Main:5.7cm × 16cm oval type × 2 / Tweeter: 8W,15W × 2
Audio Output		10W + 10W
Input	Video	1V(p-p) 75Ω
	S-Video	Y : 1V(p-p) positive
		C : 0.286V(p-p)
	Audio (L/R)	500mV(rms) (-4dBs), High impedance (RCA pin jack × 2)
Output	Video	1V(p-p) 75Ω
	Audio (L/R)	500mV(rms), Low Impedance
Input Terminal	Rear Side	EXT-1 (Video / Audio / RGB)
		EXT-2 (Video / Audio / RGB / S-VHS)
	Right Side	EXT-3 (Video / Audio)
Output Terminal	Rear Side	EXT-1 (Video / Audio)Headphone Jack (Stereo mini jack Ø3.5mm × 1)
		EXT-2 (Video / Audio)
		EXT-3 (Video / Audio)
	Right Side	Headphone Jack (Stereo mini jack Ø3.5mm × 1)
Remote Control Unit		VE-30021286 (RM-C1512B), (AA/R06 dry battery × 2) : AV-28KH1BUF
		VE-30021287 (RM-C1512S), (AA/R06 dry battery × 2) : AV-28KH1SUF

Design & specifications are subject to change without notice.

SECTION 1

PRECAUTION

1.1 SAFETY PRECAUTIONS

- (1) The design of this product contains special hardware, many circuits and components specially for safety purposes. For continued protection, no changes should be made to the original design unless authorized in writing by the manufacturer. Replacement parts must be identical to those used in the original circuits. Service should be performed by qualified personnel only.
- (2) Alterations of the design or circuitry of the products should not be made. Any design alterations or additions will void the manufacturer's warranty and will further relieve the manufacturer of responsibility for personal injury or property damage resulting therefrom.
- (3) Many electrical and mechanical parts in the products have special safety-related characteristics. These characteristics are often not evident from visual inspection nor can the protection afforded by them necessarily be obtained by using replacement components rated for higher voltage, wattage, etc. Replacement parts which have these special safety characteristics are identified in the parts list of Service manual. **Electrical components having such features are identified by shading on the schematics and by (Δ) on the parts list in Service manual.** The use of a substitute replacement which does not have the same safety characteristics as the recommended replacement part shown in the parts list of Service manual may cause shock, fire, or other hazards.
- (4) **Don't short between the LIVE side ground and ISOLATED (NEUTRAL) side ground or EARTH side ground when repairing.**
Some model's power circuit is partly different in the GND. The difference of the GND is shown by the LIVE : ($\perp$) side GND, the ISOLATED (NEUTRAL) : ($\equiv$) side GND and EARTH : ($\oplus$) side GND.
Don't short between the LIVE side GND and ISOLATED (NEUTRAL) side GND or EARTH side GND and never measure the LIVE side GND and ISOLATED (NEUTRAL) side GND or EARTH side GND at the same time with a measuring apparatus (oscilloscope etc.). If above note will not be kept, a fuse or any parts will be broken.
- (5) If any repair has been made to the chassis, it is recommended that the B1 setting should be checked or adjusted (See B1 POWER SUPPLY check).
- (6) The high voltage applied to the picture tube must conform with that specified in Service manual. Excessive high voltage can cause an increase in X-Ray emission, arcing and possible component damage, therefore operation under excessive high voltage conditions should be kept to a minimum, or should be prevented. If severe arcing occurs, remove the AC power immediately and determine the cause by visual inspection (incorrect installation, cracked or melted high voltage harness, poor soldering, etc.). To maintain the proper minimum level of soft X-Ray emission, components in the high voltage circuitry including the picture tube must be the exact replacements or alternatives approved by the manufacturer of the complete product.
- (7) Do not check high voltage by drawing an arc. Use a high voltage meter or a high voltage probe with a VTVM. Discharge the picture tube before attempting meter connection, by connecting a clip lead to the ground frame and connecting the other end of the lead through a 10k Ω 2W resistor to the anode button.

- (8) When service is required, observe the original lead dress. Extra precaution should be given to assure correct lead dress in the high voltage circuit area. Where a short circuit has occurred, those components that indicate evidence of overheating should be replaced. Always use the manufacturer's replacement components.

(9) Isolation Check (Safety for Electrical Shock Hazard)

After re-assembling the product, always perform an isolation check on the exposed metal parts of the cabinet (antenna terminals, video/audio input and output terminals, Control knobs, metal cabinet, screw heads, earphone jack, control shafts, etc.) to be sure the product is safe to operate without danger of electrical shock.

a) Dielectric Strength Test

The isolation between the AC primary circuit and all metal parts exposed to the user, particularly any exposed metal part having a return path to the chassis should withstand a voltage of 3000V AC (r.m.s.) for a period of one second. (. . . Withstand a voltage of 1100V AC (r.m.s.) to an appliance rated up to 120V, and 3000V AC (r.m.s.) to an appliance rated 200V or more, for a period of one second.)

This method of test requires a test equipment not generally found in the service trade.

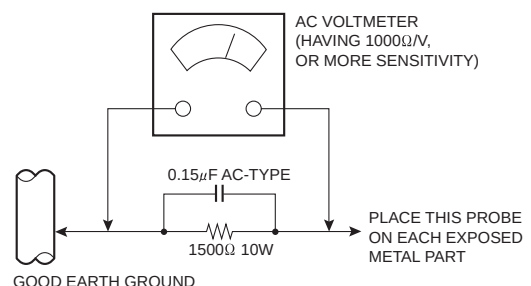
b) Leakage Current Check

Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Using a "Leakage Current Tester", measure the leakage current from each exposed metal part of the cabinet, particularly any exposed metal part having a return path to the chassis, to a known good earth ground (water pipe, etc.). Any leakage current must not exceed 0.5mA AC (r.m.s.). However, in tropical area, this must not exceed 0.2mA AC (r.m.s.).

Alternate Check Method

Plug the AC line cord directly into the AC outlet (do not use a line isolation transformer during this check.). Use an AC voltmeter having 1000 Ω per volt or more sensitivity in the following manner. Connect a 1500 Ω 10W resistor paralleled by a 0.15 μ F AC-type capacitor between an exposed metal part and a known good earth ground (water pipe, etc.). Measure the AC voltage across the resistor with the AC voltmeter. Move the resistor connection to each exposed metal part, particularly any exposed metal part having a return path to the chassis, and measure the AC voltage across the resistor. Now, reverse the plug in the AC outlet and repeat each measurement. Any voltage measured must not exceed 0.75V AC (r.m.s.). This corresponds to 0.5mA AC (r.m.s.).

However, in tropical area, this must not exceed 0.3V AC (r.m.s.). This corresponds to 0.2mA AC (r.m.s.).



SECTION 2

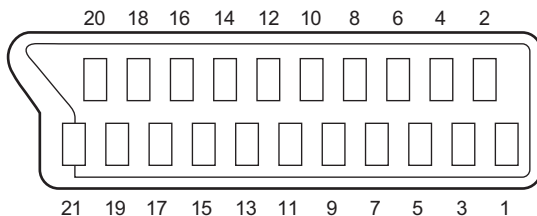
SPECIFIC SERVICE INSTRUCTIONS

2.1 21-pin Euro connector (SCART) : EXT-1 / EXT-2 / EXT-3

Pin No.	Signal Designation	Matching Value	EXT-1	EXT-2
1	AUDIO R output	500mV(rms) (Nominal), Low impedance	Used	Used
2	AUDIO R input	500mV(rms) (Nominal), High impedance	Used (R1)	Used (R2)
3	AUDIO L output	500mV(rms) (Nominal), Low impedance	Used	Used
4	AUDIO GND	---	Used	Used
5	GND (B)	---	Used	Used
6	AUDIO L input	500mV(rms) (Nominal), High impedance	Used (L1)	Used (L2)
7	B input	700mV(B-W), 75 Ω	Used	Used
8	FUNCTION SW (SLOW SW)	Low : 0V-3V, High : 8V-12V, High impedance	Used	Used
9	GND (G)	---	Used	Used
10	SCL / T-V LINK	---	Not used	Used (SCL / TV-LINK)
11	G input	700mV(B-W), 75 Ω	Used	Used
12	SDA3	---	Not used	Not used
13	GND (R)	---	Used	Used
14	GND (YS)	---	Used	Used
15	R / C input	R : 700mV(B-W), 75 Ω C : 300mV _(P-P) , 75 Ω	Used (R)	Used (C2/R)
16	Ys input (FAST SW)	Low : 0V-0.4V, 75 Ω High : 1V-3V, 75 Ω	Used	Used
17	GND (VIDEO output)	---	Used	Used
18	GND (VIDEO input)	---	Used	Used
19	VIDEO output	1V _(P-P) (Negative sync), 75 Ω	Used	Used
20	VIDEO / Y input	1V _(P-P) (Negative sync), 75 Ω	Used	Used
21	COMMON GND	---	Used	Used

(P-P= Peak to Peak, B-W= Blanking to white peak)

[Pin assignment]



2.2 FEATURES

- It is a remote controlled color television.
- 100 programs from VHF, UHF bands or cable channels can be preset.
- It can tune cable channels.
- Controlling the TV is very easy by its menu driven system.
- It has two Euroconnector sockets for external device (such as video recorder, video games, audio set, etc.)
- Side AV Input (EXT-3) available.
- Stereo sound systems (German + Nicam) are available.
- Full function Teletext (Fastext, Toptext).
- It is possible to connect headphone.
- Direct channel access.
- APS (Automatic Programming System).
- All programs can be named.
- Forward or backward automatic tuning.
- Sleep timer.
- Child Lock.
- Blue Background
- Comb Filter
- CTI
- T-V Link
- Automatic sound mute when no transmission.
- 5 minutes after the broadcasting (close down), the TV switches itself automatically to stand-by mode.
- WSS (Wide Screen Signaling)
- NTSC Playback.

2.3 MAIN DIFFERENCE LIST

Part Name	AV-28KH1BUF	AV-28KH1SUF
FRONT CABINET	VE-201279210	VE-20111863
BACK COVER	VE-20121494	VE-20120043
BACK DOOR	VE-20108124	VE-20120043
FUNCTION BUTTON	VE-20091798	VE-20096498
POWER BUTTON	VE-20111864	VE-20120046
REMOTE CONTROL UNIT	VE-30021286 (RM-C1512B)	VE-30021287 (RM-C1512S)

SECTION 3

DISASSEMBLY

3.1 DISASSEMBLY PROCEDURE

3.1.1 REMOVING THE REAR COVER

- (1) Unplug the power cord.
- (2) Remove the 8 screws [A] as shown in the Fig. 1.
- (3) Remove the 4 screws [B].
- (4) Withdraw the REAR COVER toward you.

3.1.2 REMOVING THE BACK DOOR

- Remove the REAR COVER
 - (1) Remove the 2 screws [C].
 - (2) Withdraw the BACK DOOR toward you.

3.1.3 REMOVING THE MAIN PWB

- Remove the REAR COVER.
- Remove the BACK DOOR.
 - (1) Remove the 4 screws [D].
 - (2) Slightly raise the both sides of the MAIN PWB by hand and withdraw the MAIN PWB backward.

CAUTION :

If necessary, take off the wire clamp, connectors etc.
Be careful enough when developing a MAIN PWB.

3.1.4 REMOVING THE FEATURE BOX PWB

- Remove the REAR COVER.
- Remove the BACK DOOR.
 - (1) Disconnect the connector PL423 and PL424 on the MAIN PWB.
 - (2) Raise up the both sides and disconnect the FEATURE BOX PWB.

3.1.5 REMOVING THE SIDE CONTROL PWB

- Remove the REAR COVER.
 - (1) Remove the 4 screws [E].
 - (2) Remove the SIDE PWB.

3.1.6 REMOVING THE BASE

- Remove the REAR COVER.
 - (1) Remove the 2 screws [F].
 - (2) Remove the BASE.

NOTE:

Work after fixing so that a CRT screen may be placed upside down or it may not fall.

3.1.7 REMOVING THE POWER SWITCH PWB

- Remove the REAR COVER.
 - (1) Remove the 2 screws [G], and remove the POWER SWITCH PWB.

3.1.8 REMOVING THE LED PWB

- Remove the REAR COVER.
- Remove the POWER SWITCH PWB.
 - (1) Remove the 2 screws [H], and remove the LED PWB.

3.1.9 REMOVING THE SPEAKER and TWEETER

- Remove the REAR COVER.
 - (1) Remove the 4 screws [I], and remove the SPEAKER.
 - (2) Remove the other hand SPEAKER in the same steps.
 - (3) Remove the 2 screws [J], and remove the TWEETER.
 - (4) Remove the other hand TWEETER in the same steps.

3.1.10 CHECKING THE PW BOARD

- To check the back side of the PW Board.
 - (1) Pull out the PW Board. (Refer to REMOVING THE MAIN PWB).
 - (2) Erect the PW Board vertically so that you can easily check the back side of the PW Board.

CAUTION :

- When erecting the PW Board, be careful so that there will be no contacting with other PW Board.
- Before turning on power, make sure that the wire connector is properly connected.
- When conducting a check with power supplied, be sure to confirm that the CRT EARTH WIRE (BRAIDED ASS'Y) is connected to the CRT SOCKET PW board.

3.1.11 WIRE CLAMPING AND CABLE TYING

- (1) Be sure to clamp the wire.
- (2) Never remove the cable tie used for tying the wires together.
Should it be inadvertently removed, be sure to tie the wires with a new cable tie.

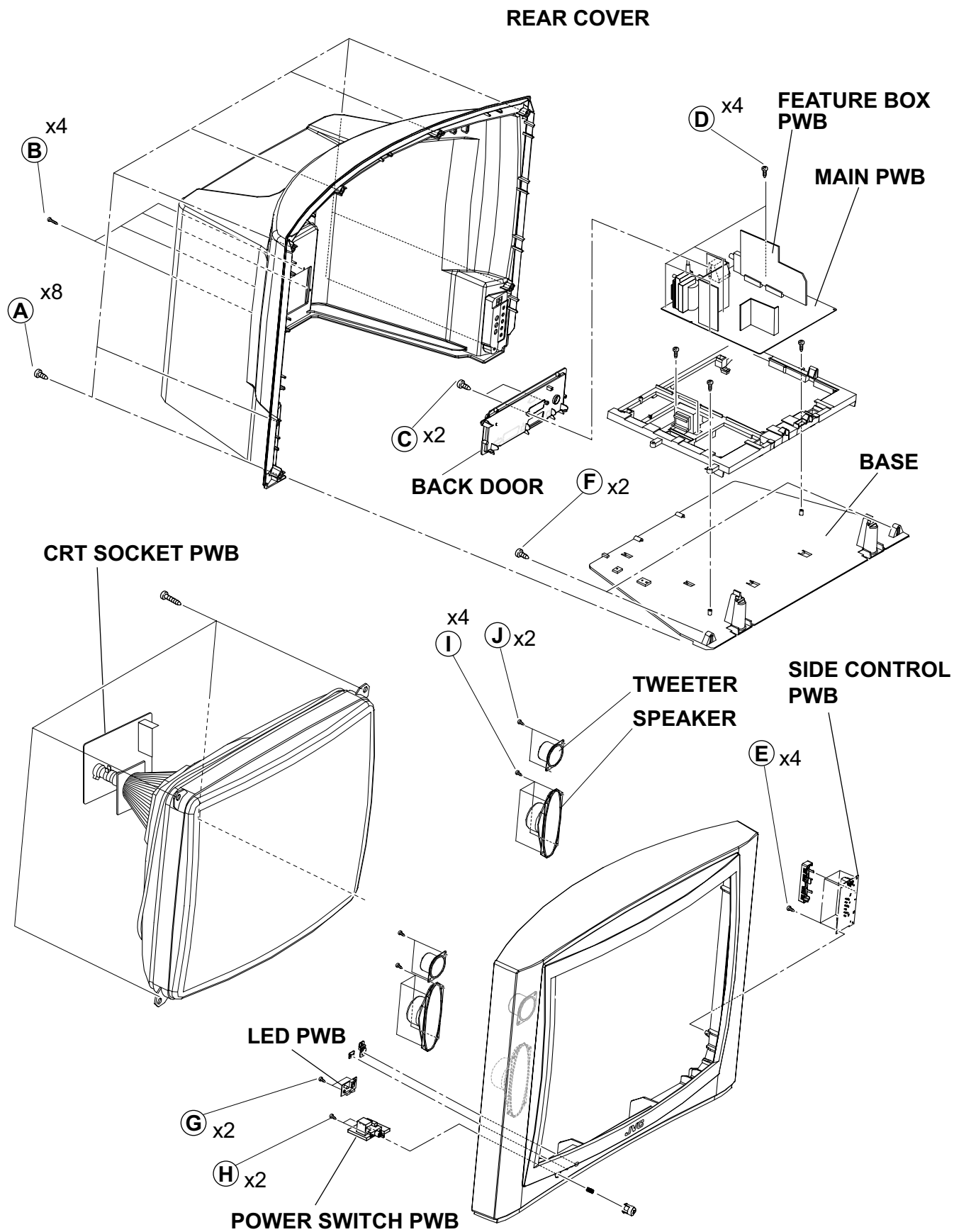


Fig.1

3.2 REPLACEMENT OF CHIP COMPONENT

3.2.1 CAUTIONS

- (1) Avoid heating for more than 3 seconds.
- (2) Do not rub the electrodes and the resist parts of the pattern.
- (3) When removing a chip part, melt the solder adequately.
- (4) Do not reuse a chip part after removing it.

3.2.2 SOLDERING IRON

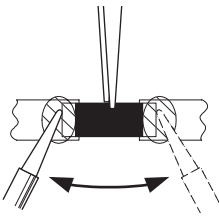
- (1) Use a high insulation soldering iron with a thin pointed end of it.
- (2) A 30w soldering iron is recommended for easily removing parts.

3.2.3 REPLACEMENT STEPS

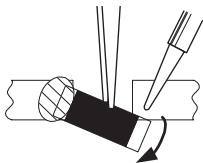
1. How to remove Chip parts

[Resistors, capacitors, etc.]

- (1) As shown in the figure, push the part with tweezers and alternately melt the solder at each end.



- (2) Shift with the tweezers and remove the chip part.

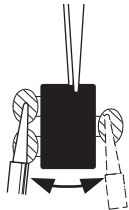


[Transistors, diodes, variable resistors, etc.]

- (1) Apply extra solder to each lead.



- (2) As shown in the figure, push the part with tweezers and alternately melt the solder at each lead. Shift and remove the chip part.



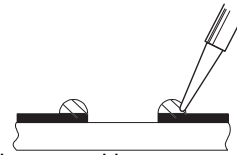
NOTE :

After removing the part, remove remaining solder from the pattern.

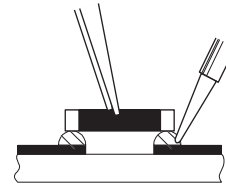
2. How to install Chip parts

[Resistors, capacitors, etc.]

- (1) Apply solder to the pattern as indicated in the figure.

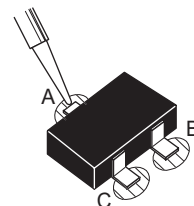


- (2) Grasp the chip part with tweezers and place it on the solder. Then heat and melt the solder at both ends of the chip part.

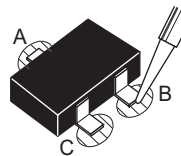


[Transistors, diodes, variable resistors, etc.]

- (1) Apply solder to the pattern as indicated in the figure.
- (2) Grasp the chip part with tweezers and place it on the solder.
- (3) First solder lead **A** as indicated in the figure.



- (4) Then solder leads **B** and **C**.



3.3 SETTING OF THE LAST MEMORY FOR SHIPMENT

3.3.1 USER SETTING VALUES

Setting Item	Setting Value	Setting Item	Setting Value
SOUND MENU		FEATURE MENU	
BALANCE	CENTER	SLEEP TIMER	OFF
BASS	CENTER	CHILD LOCK	OFF
TREBLE	CENTER		
HYPER SOUND	OFF		
PICTURE MENU		INSTALL	
BRIGHTNESS	These adjust are automatically restored when APS bit in Service menu is set. The procedure for setting APS bit is described below.	LANGUAGE	ENGLISH
CONTRAST		COUNTRY	Other
COLOUR		EXT-2 OUTPUT	TV
SHARPNESS			
COLOUR TEMP			
ZOOM			
HUE (only NTSC)			

3.3.2 SETTING APS BIT IN SERVICE MENU

- (1) Enter service menu in TV mode by pressing [INFORMATION] and [MUTING] keys simultaneously. Service Menu will appear.
- (2) Select VIDEO by pressing [GREEN] key on the remote control unit.
- (3) Select APS items by pressing the [▲/▼] keys on the remote control unit.
- (4) Change the value to [ON] by pressing [◀/▶] keys on the remote control unit.
- (5) Store the change by pressing [INFORMATION] key.
- (6) Press [MENU] key on the remote control unit to exit service mode.

SECTION 4 ADJUSTMENT

4.1 ADJUSTMENT PREPARATION

- (1) You can make the necessary adjustments for this unit with either the Remote Control Unit or with the adjustment tools and parts as given below.
- (2) Adjustment with the Remote Control Unit is made on the basis of the initial setting values, however, the new setting values which set the screen to its optimum condition may differ from the initial settings.
- (3) Make sure that AC power is turned on correctly.
- (4) Turn on the power for set and test equipment before use, and start the adjustment procedures after waiting at least 30 minutes.
- (5) Unless otherwise specified, prepare the most suitable reception or input signal for adjustment.
- (6) Never touch any adjustment parts which are not specified in the list for this adjustment - variable resistors, transformers, condensers, etc.
- (7) Presetting before adjustment.
Unless otherwise specified in the adjustment instructions, preset the following functions with the remote control unit:

Setting Item	Setting value
BRIGHTNESS	CENTER
CONTRAST	
COLOUR	
SHARPNESS	
COLOUR TEMP	
ZOOM	FULL

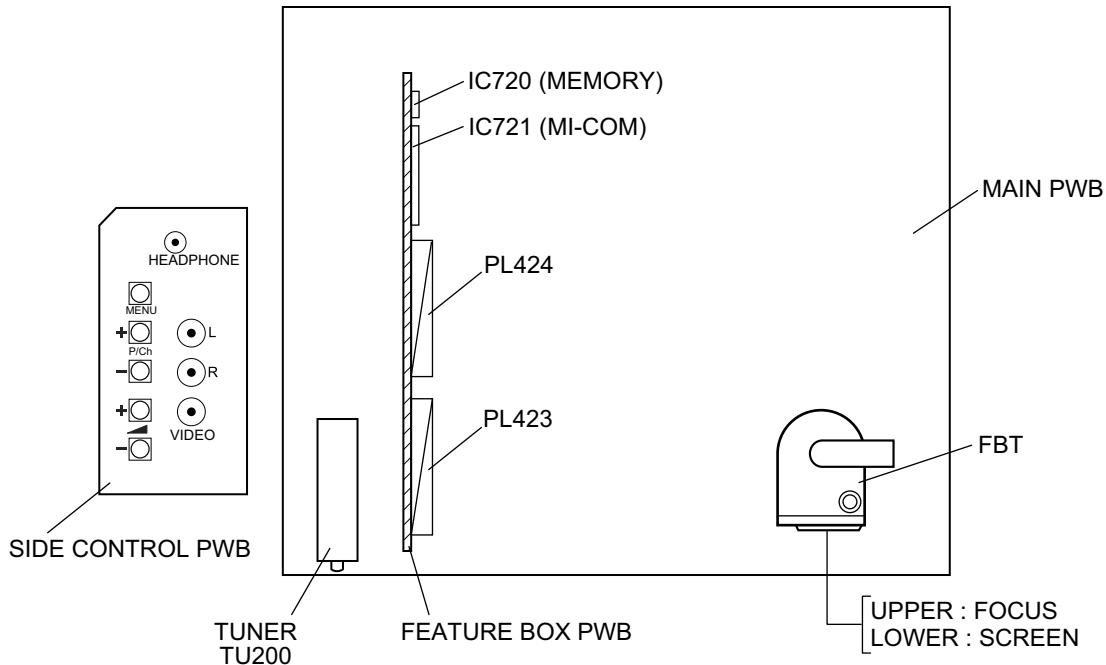
4.2 MEASURING EQUIPMENT

- (1) DC voltmeter (or digital voltmeter)
- (2) Signal generator (Pattern generator) : [PAL / SECAM / NTSC]
- (3) Remote control unit

4.3 ADJUSTMENT ITEM

- SCREEN ADJUSTMENT
- DEFLECTION CIRCUIT ADJUSTMENT
- GEOMETRY MENU ADJUSTMENT
- WHITE BALANCE ADJUSTMENT

4.4 ADJUSTMENT LOCATIONS



4.5 BASIC OPERATION OF SERVICE MENU

4.5.1 HOW TO ENTER THE SERVICE MENU

- (1) Press the [INFORMATION] key and [MUTING] key simultaneously, and the SERVICE MENU screen (Fig.1) will be displayed.

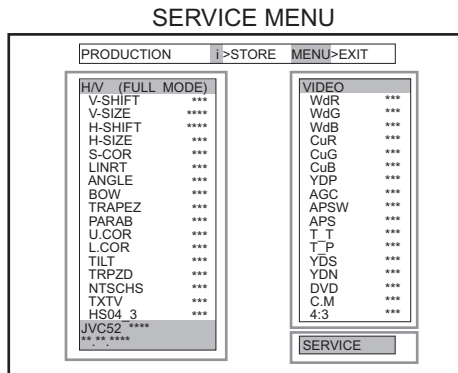


Fig.1

- (2) While the SERVICE MENU screen is displayed, press the [BLUE] key for access to the SERVICEMENU 2 (Fig.2).

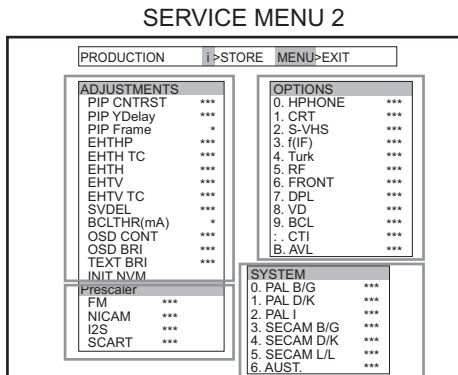
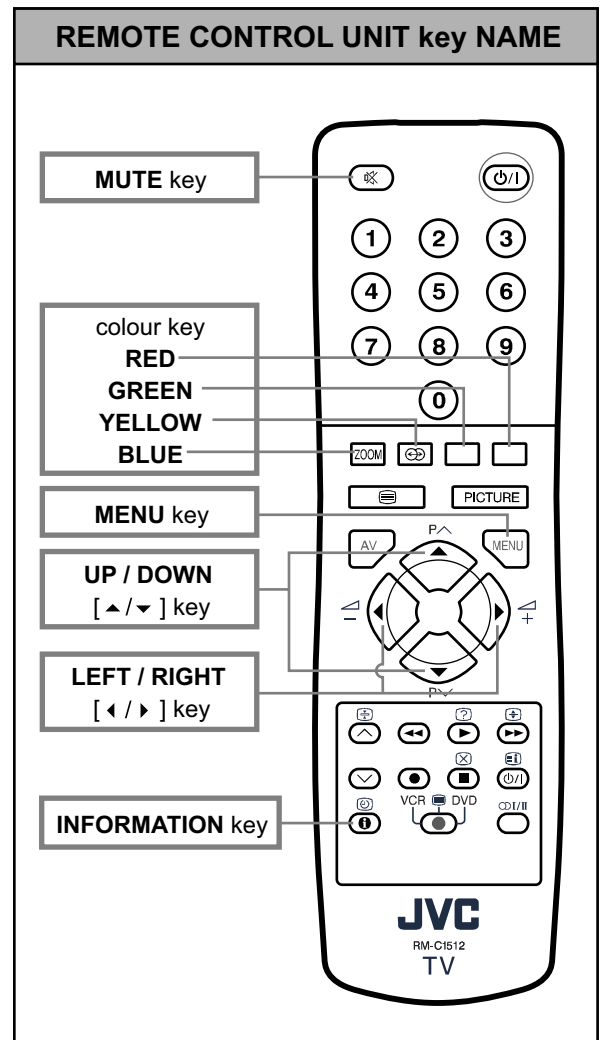


Fig.2



4.5.2 SELECTION OF ADJUSTMENT ITEMS

- (1) Enter the SERVICE MENU
- (2) Press the [COLOUR (RED, GREEN, YELLOW or BLUE)] key and select the service menu section. (refer to next page.)
- (3) Press the FUNCTION [5]/[6] key and select the ADJUSTMENT ITEM.
- (4) Press the FUNCTION [3]/[4] key and set the SETTING VALUE.
- (5) Press the [INFORMATION] key to STORE.

4.5.3 HOW TO EXIT SERVICE MODE

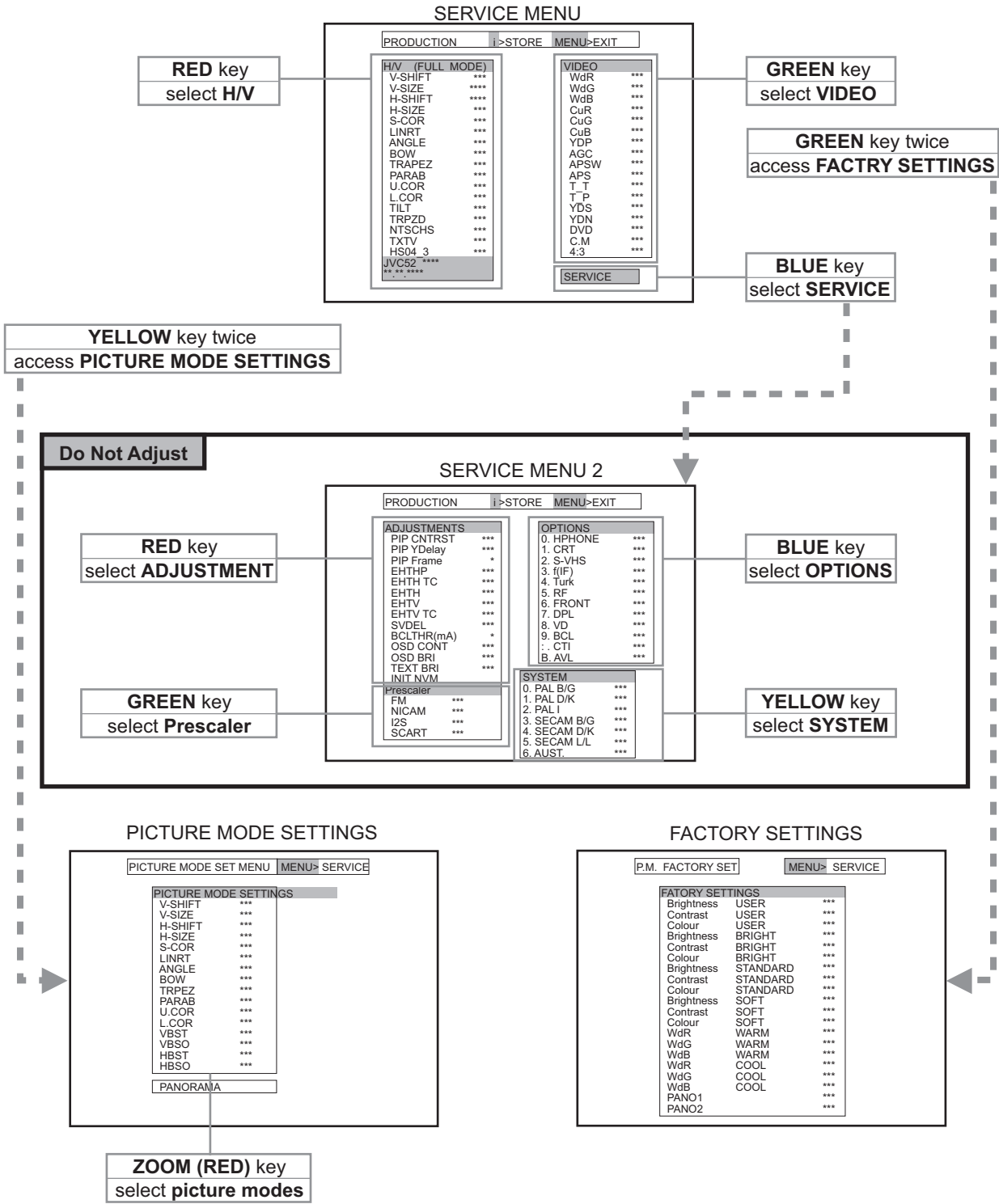
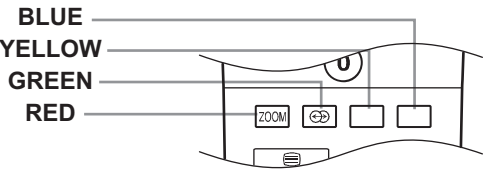
- (1) Press the [MENU] key.

4.5.4 COLOUR KEY FUNCTION AND SCREEN SIDPLAY

Colour key function in the SERVICE MENU

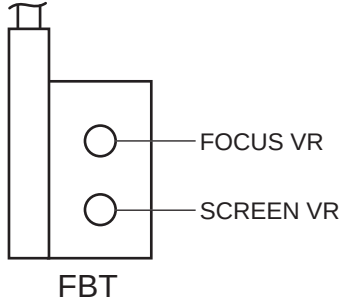
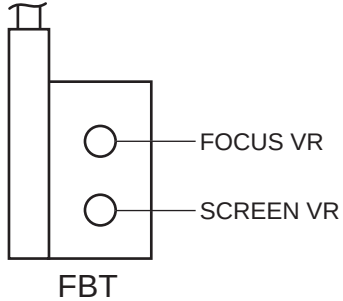
colour key	press time	select menu
RED	once	H/V
	twice	---
GREEN	once	VIDEO
	twice	FACTRY SETTINGS
YELLOW	once	---
	twice	PICTURE MODE SETTINGS
BLUE	once	SERVICE (SERVICE MENU 2)
	twice	---

colour key location



4.6 ADJUSTMENT PROCEDURE

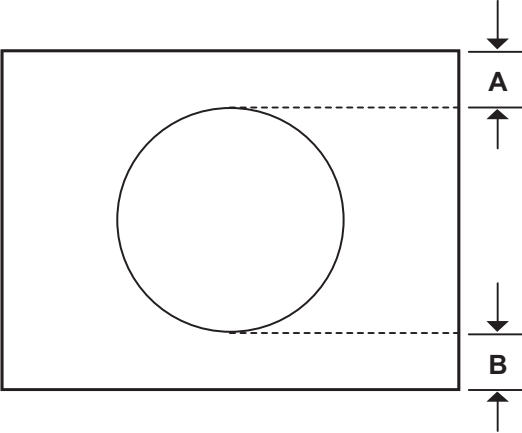
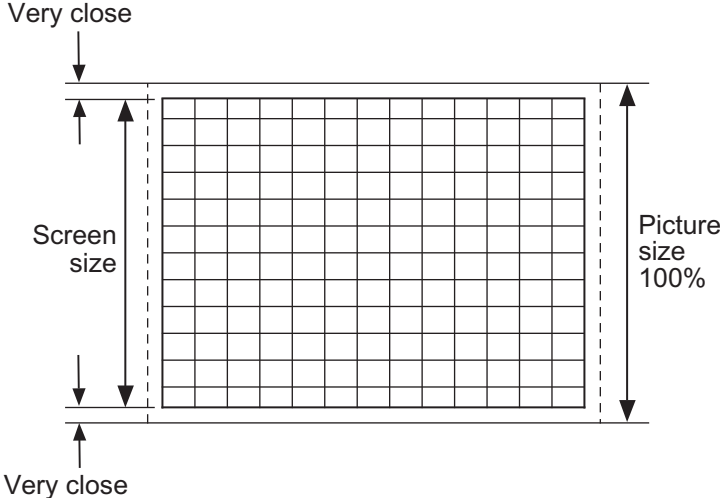
4.6.1 FOCUS / SCREEN ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
FOCUS adjustment	Signal generator Remote control unit		FOCUS VR [On the FBT]	(1) Receive a cross-hatch signal. (2) Adjust FOCUS VR on the FBT as thin as possible.  The diagram shows a cross-section of a Fluorescent Beam Tube (FBT). It features a vertical section on the left and a larger rectangular section on the right. Two circular adjustment points are located on the right section: the top one is labeled 'FOCUS VR' and the bottom one is labeled 'SCREEN VR'. The entire assembly is labeled 'FBT' at the bottom.
SCREEN adjustment	Signal generator Remote control unit	1pin (GND) RGB cathodes [CRT PWB]	SCREEN VR [On the FBT]	(1) Receive a colour-bar signal. (2) Ground pin of probe will be connected to 1pin (GND) of the CRT socket. (3) 1/100 oscilloscope probe to RGB cathodes on CRT PWB. (4) Adjust all control functions (brightness, colour and contrast) to minimum settings. (5) Adjust the SCREEN VR until acthode voltage becomes 150V.  The diagram shows a cross-section of a Fluorescent Beam Tube (FBT). It features a vertical section on the left and a larger rectangular section on the right. Two circular adjustment points are located on the right section: the top one is labeled 'FOCUS VR' and the bottom one is labeled 'SCREEN VR'. The entire assembly is labeled 'FBT' at the bottom.

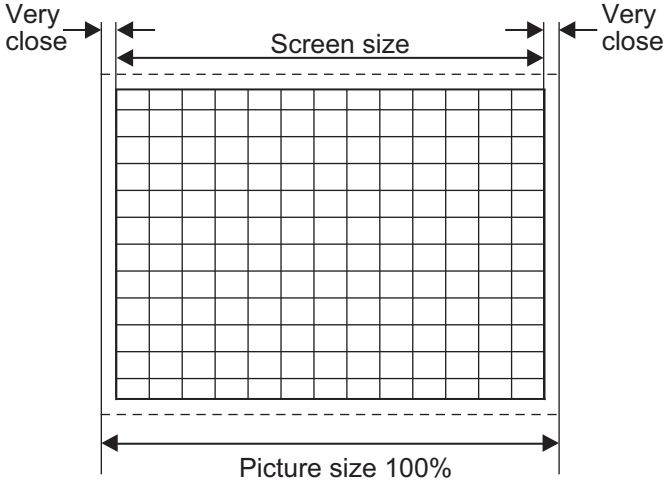
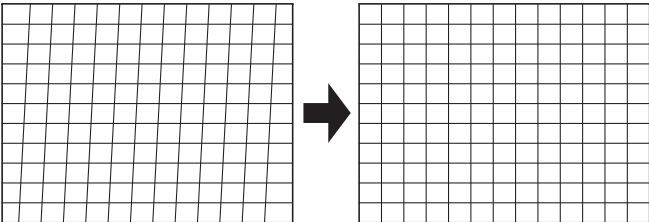
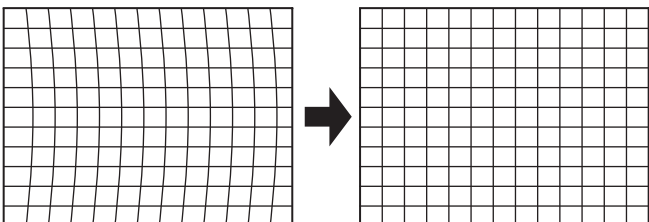
4.6.2 AGC ADJUSTMENT

Item	Measuring instrument	Test point	Adjustment part	Description
AGC adjustment	Signal generator Remote control unit Volt meter		AGC	(1) Receive a PAL BG signal at 60dBmV RF signal level. (2) Enter the SERVICE MENU. (3) Press the [GREEN] key, then enter the VIDEO adjustment group. (4) Select AGC. (5) Adjust AGC by pressing till voltage at pin 1 of TUNER is equal to 3.0V. (6) Press the [INFORMATION] key and memorize the set value.

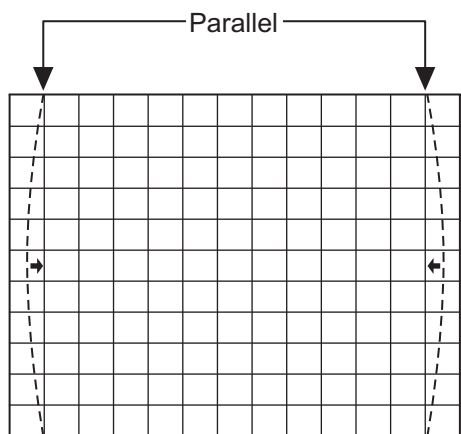
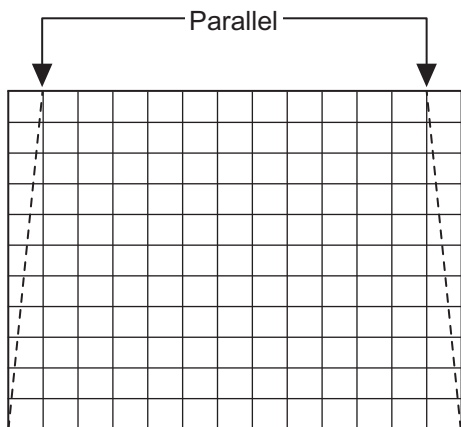
4.6.3 DEFLECTION CIRCUIT ADJUSTMENT

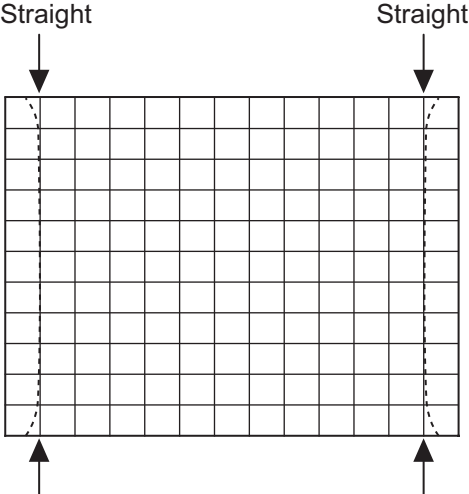
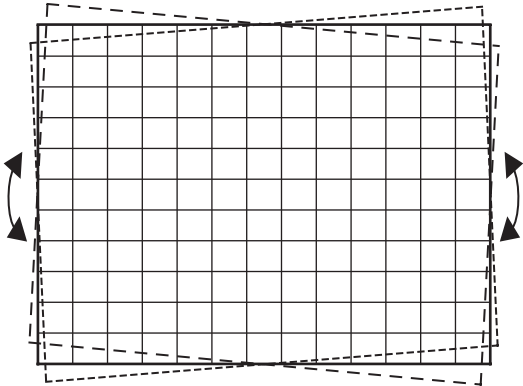
Item	Measuring instrument	Test point	Adjustment part	Description
VERTICAL SHIFT adjustment	Signal generator Remote control unit		V-SHIFT	(1) Receive a circle pattern signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select V-SHIFT. (5) Adjust V-SHIFT to make A=B. (6) Check and readjust V-SHIFT item if the adjustment becomes improper after some other geometric adjustments are done. (7) Press the [INFORMATION] key and memorize the set value.
				
VERTICAL SIZE adjustment	Signal generator Remote control unit		V-SIZE	(1) Receive a cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select V-SIZE. (5) Adjust V-SIZE until horizontal black lines on both the upper and lower part of the cross-hatch pattern become very closeted the upper and lower horizontal sides of picture size and nearly about to disappear. (6) Check and readjust V-SIZE item if the adjustment becomes improper after some other geometric adjustments are done. (7) Press the [INFORMATION] key and memorize the set value.
				

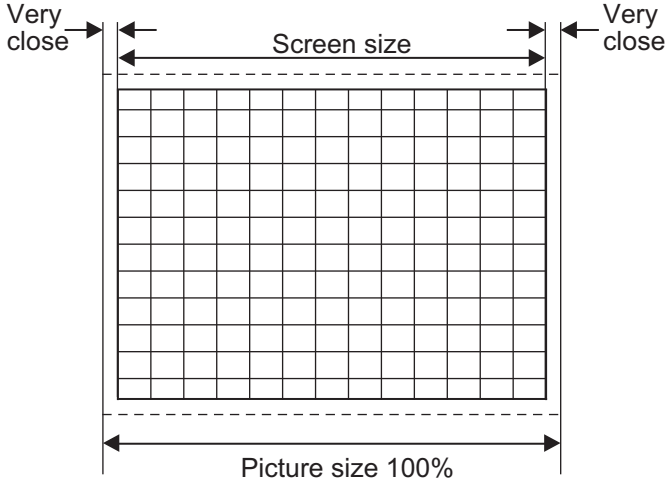
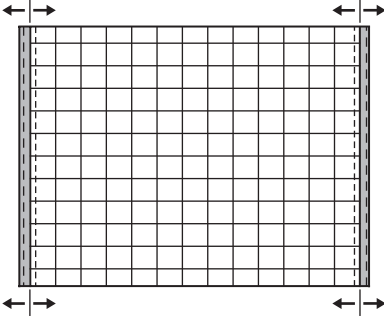
Item	Measuring instrument	Test point	Adjustment part	Description
VERTICAL S-CORRECTION & LINEARITY adjustment	Signal generator		S-COR	(1) Receive a cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select S-COR. (5) Adjust S-COR till the size of squares on both the upper and lower part of cross-hatch pattern become equal to the squares laying on the vertical center of the cross-hatch pattern. (6) Check and readjust S-COR item if the adjustment becomes improper after some other geometric adjustments are done. (7) Press the [INFORMATION] key and memorize the set value. (8) Select LINRT. (9) Adjust LINRT till all the size of squares of the cross-hatch pattern become in equal size from the top of the screen to its bottom of the whole screen. (10) Check and readjust LINRT item if the adjustment becomes improper after some other geometric adjustments (especially after than S-COR adjustment) are done. (11) Press the [INFORMATION] key and memorize the set value.
	Remote control unit		LINRT	
HORIZONTAL SHIFT adjustment	Signal generator		H-SHIFT	(1) Receive a circle pattern signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select H-SHIFT. (5) Adjust H-SHIFT to make C=D. (6) Check and readjust H-SHIFT item if the adjustment becomes improper after some other geometric adjustments are done. (7) Press the [INFORMATION] key and memorize the set value.
	Remote control unit			

Item	Measuring instrument	Test point	Adjustment part	Description
HORIZONTAL SIZE adjustment	Signal generator Remote control unit		H-SIZE	(1) Receive a cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select H-SIZE. (5) Adjust H-SIZE until vertical lines on both the left and right part of the cross-hatch will be visible nor screen will be so wide. (6) Check and readjust H-SIZE item if the adjustment becomes improper after some other geometric adjustments are done. (7) Press the [INFORMATION] key and memorize the set value.
				
ANGLE adjustment	Signal generator Remote control unit		ANGLE	(1) Receive a cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select ANGLE. (5) Adjust ANGLE till the vertical lines of the cross-hatch pattern become straight. (6) Check and readjust ANGLE item if the adjustment becomes improper after some other geometric adjustments are done. (7) Press the [INFORMATION] key and memorize the set value.
				
BOW adjustment	Signal generator Remote control unit		BOW	(1) Receive a cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select BOW. (5) Adjust BOW till the vertical lines become straight. (6) Check and readjust BOW item if the adjustment becomes improper after some other geometric adjustments are done. (7) Press the [INFORMATION] key and memorize the set value.
				NOTE: In case where there is a bow-shaped distortion of images on the screen. (Figure)

Item	Measuring instrument	Test point	Adjustment part	Description
TRAPEZIUM adjustment	Signal generator		TRAPEZ	(1) Receive a cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select TRAPEZ. (5) Adjust TRAPEZ till vertical lines, especially lines at the sides of the picture frame become parallel to the both sides of picture tubes as close as possible. (6) Check and readjust TRAPEZ item if the adjustment becomes improper after some other geometric adjustments are done. (7) Press the [INFORMATION] key and memorize the set value.
	Remote control unit			
SIDE PIN adjustment	Signal generator		PARAB	(1) Receive a cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select PARAB. (5) Adjust PARAB till vertical lines close to the both sides of the picture frame become parallel to vertical sides of picture tube without any bending to left or to right side of the screen. (6) Check and readjust PARAB item if the adjustment becomes improper after some other geometric adjustments are done. (7) Press the [INFORMATION] key and memorize the set value.
	Remote control unit			



Item	Measuring instrument	Test point	Adjustment part	Description
CORNER adjustment	Signal generator		U.COR	(1) Receive a cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select U.COR. (5) Adjust U.COR till vertical lines at the upper corners of the picture frame become vertical and parallel to vertical corner sides of picture tube. (6) Check and readjust U.COR item if the adjustment becomes improper after some other geometric adjustments are done. (7) Select L.COR. (8) Adjust L.COR till vertical lines at the lower corners of the picture frame become vertical and parallel to vertical corner sides of picture tube. (9) Check and readjust L.COR item if the adjustment becomes improper after some other geometric adjustments are done. (10) Press the [INFORMATION] key and memorize the set value.
	Remote control unit		L.COR	
				
ROTATION adjustment	Signal generator		TILT	(1) Receive a cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select TILT. (5) Adjust TILT to rotate the complete master clock-wise and counter clock-wise depending on the CRT. (6) Check and readjust TRAPEZ item if the adjustment becomes improper after some other geometric adjustments are done. (7) Press the [INFORMATION] key and memorize the set value.
	Remote control unit			
				

Item	Measuring instrument	Test point	Adjustment part	Description
NTSC HORIZONTAL SIZE adjustment	Signal generator Remote control unit		NTSCHS	(1) Receive a NTSC cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select NTSCHS. (5) Adjust NTSCHS till vertical lines on both the left and right part of the cross-hatch will be visible nor screen will be so wide. (6) Check and readjust TRAPEZ item if the adjustment becomes improper after some other geometric adjustments are done. (7) Press the [INFORMATION] key and memorize the set value.
 The diagram shows a rectangular grid representing a screen. Above the grid, a horizontal double-headed arrow spans the width of the grid and is labeled 'Screen size'. Below the grid, another horizontal double-headed arrow spans the width and is labeled 'Picture size 100%'. On the left and right sides of the grid, there are vertical double-headed arrows pointing inwards towards the grid, each labeled 'Very close'.				
TELETEXT SCREEN adjustment	Signal generator Remote control unit		TXTV	(1) Receive a cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select TXTV. (5) Adjust TXTV to adjust the proper vertical size of Teletext screen. (6) Check and readjust TRAPEZ item if the adjustment becomes improper after some other geometric adjustments are done. (7) Press the [INFORMATION] key and memorize the set value.
4:3 TUBE adjustment	Signal generator Remote control unit		HS04_3	(1) Receive a cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [RED] key, then enter the H/V adjustment group. (4) Select HS04_3. (5) Adjust HS04_3 to adjust the proper horizontal size of 4:3 tube. (6) Press the [INFORMATION] key and memorize the set value.
 The diagram shows a rectangular grid. At the top, bottom, left, and right edges of the grid, there are horizontal double-headed arrows pointing outwards, indicating the horizontal adjustment of the tube.				

4.6.4 VIDEO CIRCUIT

Item	Measuring instrument	Test point	Adjustment part	Description
WHITE BALANCE adjustment	Signal generator Remote control unit		WdR WdG WdB	(1) Receive a black & white signal. (2) Enter the SERVICE MENU. (3) Press the [GREEN] key, then enter the VIDEO adjustment group. (4) Select WdR, WdG and WdB respectively. (5) Adjust WdR, WdG and WdB respectively, until the white part turns to pure white without any other colour. (6) Press the [INFORMATION] key and memorize the set value.
COLOUR CUTOFF LEVEL adjustment	Signal generator Remote control unit		CuR CuG CuB	(1) Receive a cross-hatch signal. (2) Enter the SERVICE MENU. (3) Press the [GREEN] key, then enter the VIDEO adjustment group. (4) Select CuR, CuG and CuB respectively. (5) Adjust CuR, CuG and CuB respectively, and set the values of these items as 64 (contrast). (6) Press the [INFORMATION] key and memorize the set value.
PAL Y DELAY adjustment	Signal generator Remote control unit		YDP	(1) Receive a PAL colour bar signal. (2) Enter the SERVICE MENU. (3) Press the [GREEN] key, then enter the VIDEO adjustment group. (4) Select YDP. (5) Adjust YDP till the colour transients on the colour bar pattern becomes as sharper and possible as colours between transients do not mix with each other. (6) Press the [INFORMATION] key and memorize the set value.
SECAM Y DELAY adjustment	Signal generator Remote control unit		YDS	(1) Receive a SECAM colour bar signal. (2) Enter the SERVICE MENU. (3) Press the [GREEN] key, then enter the VIDEO adjustment group. (4) Select YDS. (5) Adjust YDS by pressing till the colour transients on the colour bar pattern becomes as sharper and possible as colours between transients do not mix with each other. (6) Press the [INFORMATION] key and memorize the set value.
NTSC Y DELAY adjustment	Signal generator Remote control unit		YDN	(1) Receive a NTSC colour bar signal from an external source (e.g. FRONT AV : EXT 4). (2) Enter the SERVICE MENU. (3) Press the [GREEN] key, then enter the VIDEO adjustment group. (4) Select YDN. (5) Adjust YDN by pressing till the colour transients on the colour bar pattern becomes as sharper and possible as colours between transients do not mix with each other. (6) Press the [INFORMATION] key and memorize the set value.

SECTION 5

TROUBLESHOOTING

This service manual does not describe TROUBLESHOOTING.



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